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(30)Priority

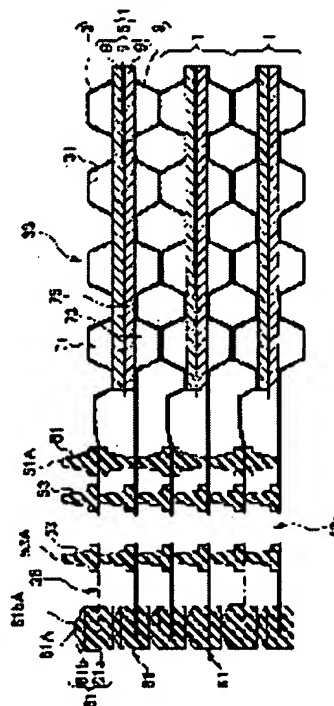
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## (54) FUEL CELL AND FUEL CELL STACK

(57)Abstract:

PROBLEM TO BE SOLVED: To enable to absorb expansion and contraction of a separator in the laminating direction in a fuel cell of a solid polyelectrolyte membrane type.

SOLUTION: In the fuel cell 1 of the solid polyelectrolyte membrane type wherein a pair of electrodes 9 is installed at both sides of a solid polyelectrolyte membrane 7 and this outside is pinched by a pair of separators 3, an insulating picture frame-shaped member 61 to allow the expansion and contraction of a distance of the separators while sealing a gap between the separators 3 are installed at the outer brim part of the separators 3.



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[Date of extinction of right]

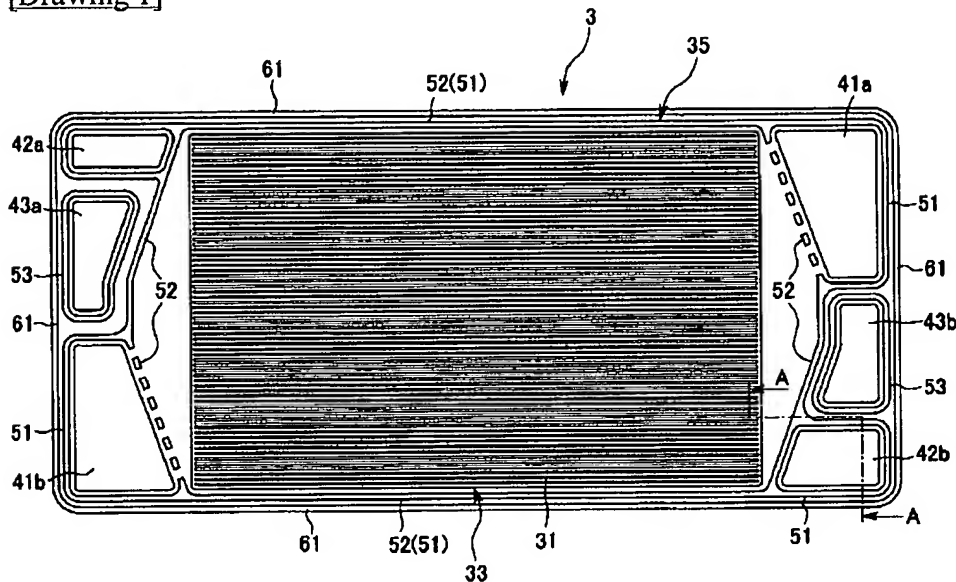
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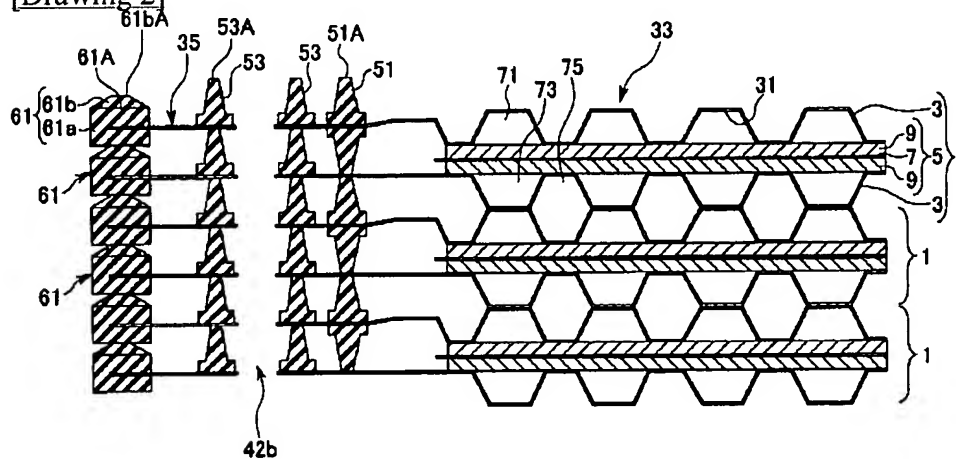
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## DRAWINGS

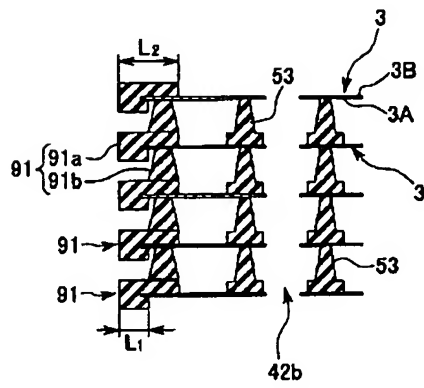
[Drawing 1]



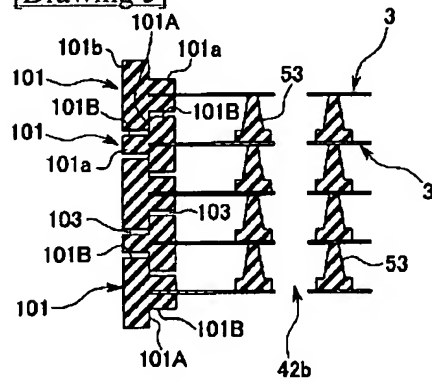
[Drawing 2]



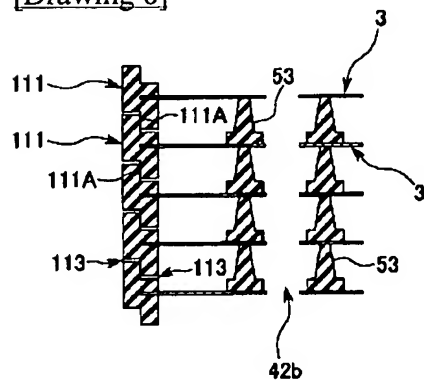
[Drawing 4]



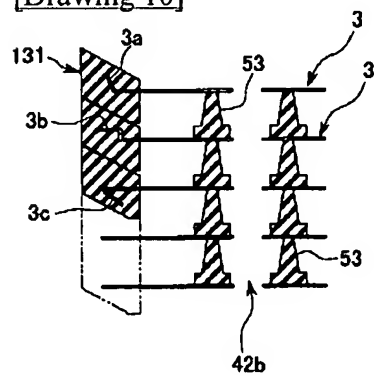
[Drawing 5]



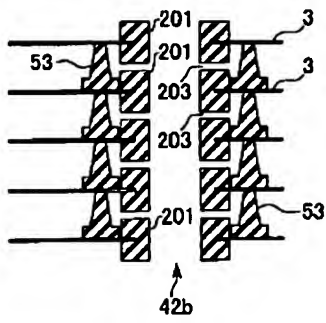
[Drawing 6]



[Drawing 10]

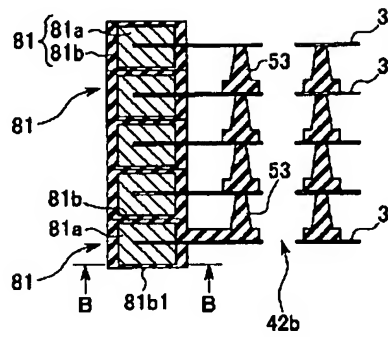


[Drawing 11]

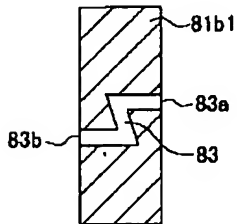


[Drawing 3]

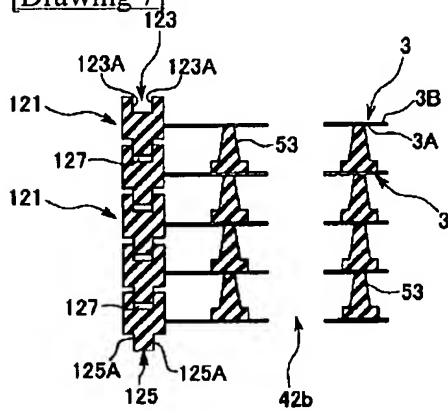
(a)



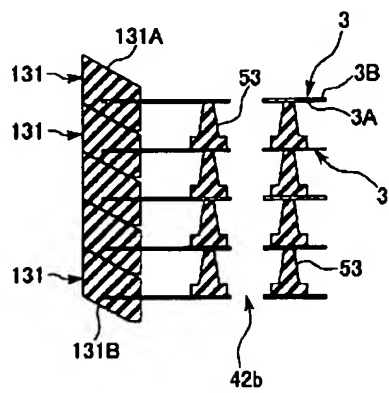
(b)



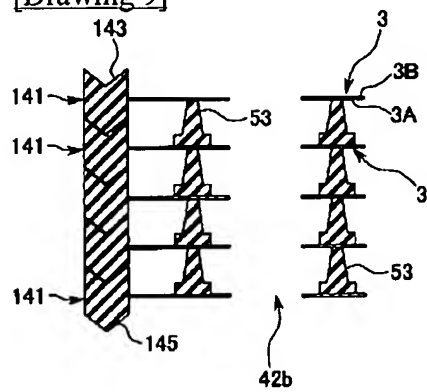
[Drawing 7]



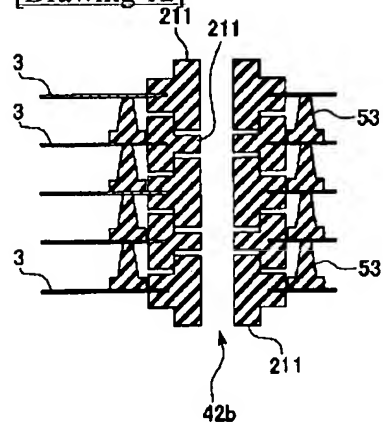
[Drawing 8]



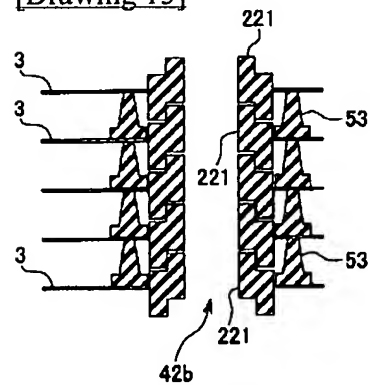
[Drawing 9]



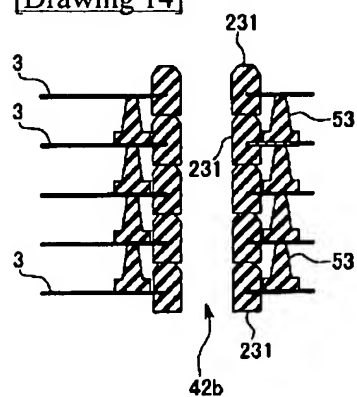
[Drawing 12]



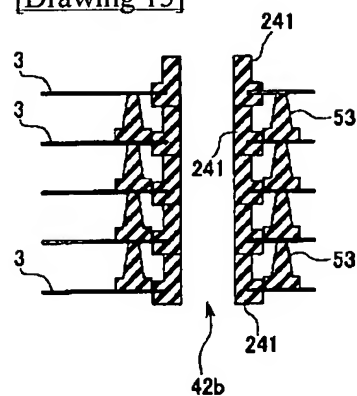
[Drawing 13]



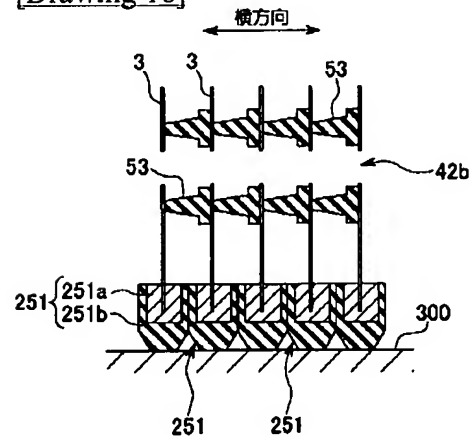
[Drawing 14]



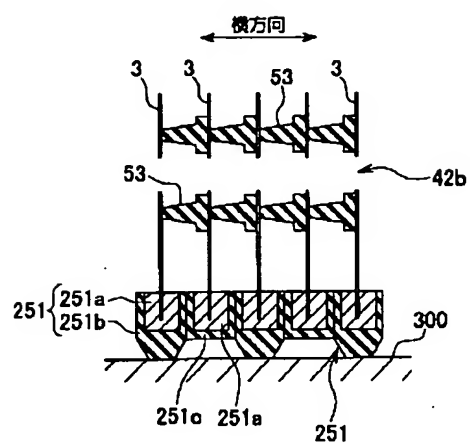
[Drawing 15]



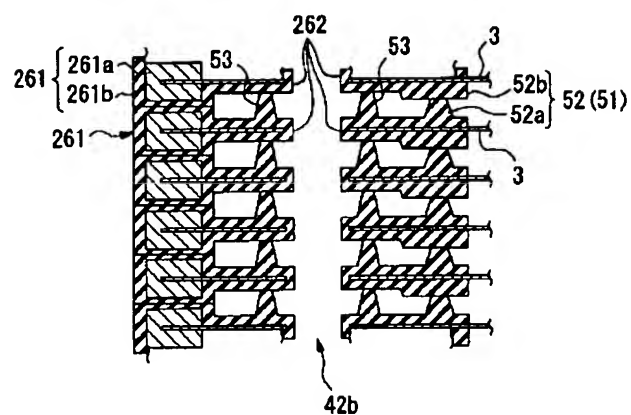
[Drawing 16]



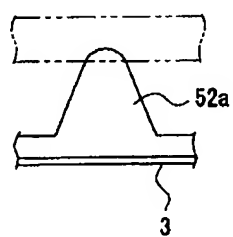
[Drawing 17]



[Drawing 18]  
(a)

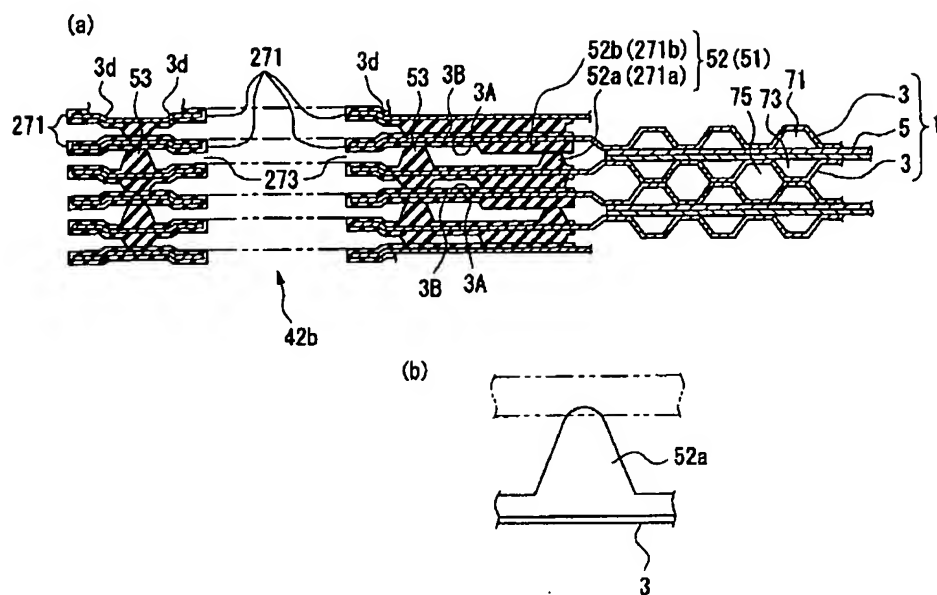


(b)



[Drawing 19]





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[Translation done.]

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the fuel cell stack which carried out two or more laminatings of the fuel cell and this fuel cell of a solid-state polyelectrolyte membrane type, and relates to a technique effective in flexible absorption of the direction of a separator laminating etc. especially.

[0002]

[Description of the Prior Art] The electrode of a pair is prepared in the both sides of the solid-state polyelectrolyte film, and there is a solid-state polyelectrolyte membrane type fuel cell which pinched the outside with the separator of a pair among the fuel cells. In this fuel cell, while establishing the passage of fuel gas (for example, hydrogen) in one electrode at the whole surface of the separator by which opposite arrangement is carried out, the passage of oxidant gas (for example, air containing oxygen) was established in the electrode of another side at the whole surface of the separator by which opposite arrangement is carried out, and the passage of a cooling medium is established in the field which counters one of electrodes, and the field of the opposite side.

[0003] And if fuel gas is supplied to one electrode reaction side, hydrogen will be ionized here and it will move to the electrode of another side through the solid-state polyelectrolyte film. The electron produced in the meantime is taken out by the external circuit, and is used as electrical energy of a direct current. In the electrode of said another side, since oxidant gas is supplied, a hydrogen ion, an electron, and oxygen react and water is generated. The electrode reaction side of a separator and the field of the opposite side are cooled by the cooling medium which flows between separators.

[0004] Since it is necessary to let these reactant gas and a cooling medium pass to the passage which became independent respectively, they become important [ the seal technique of dividing between each passage ]. As a seal part, reactant gas and a cooling medium The perimeter of the free passage hole by which penetration formation was carried out, the periphery of the electrode layer structure which consists of solid-state polyelectrolyte film and an electrode of the pair arranged in the both sides, the refrigerant passage side periphery of a separator, the periphery on the rear face of front of a separator, etc. are in a separator that distribution supply should be carried out at each fuel cell of a fuel cell stack. As a sealant, things which have repulsive force moderately softly, such as organic rubber, are adopted, for example.

[0005]

[Problem(s) to be Solved by the Invention] By the way, when two or more set laminating of the fuel cell is carried out, a fuel cell stack is constituted and it carries this fuel cell stack in a car, waterdrop etc. disperses depending on that installation location, a fuel cell may carry out water-ed, or dust may trespass upon the clearance between separators. However, it can be prevented by the above-mentioned sealant that these water and dust invade in reactant gas passage and cooling-medium passage.

[0006] However, since dispersion is not in the thickness of the electrode layer structure, neither curvature nor distortion is in a separator (especially metal thin separator), the laminating of the separators is not carried out to the compressive load received from the both ends of a fuel cell stack

being uneven in parallel but an inclination and a twist occur in case the laminating of the separator is carried out, imbalance arises in the amount of compression of each sealant, and seal nature gets worse about a sealant with little amount of compression. Moreover, in case the laminating of the separator is carried out, it is also difficult not to shift the relative position along an electrode reaction side, but to carry out a laminating correctly between separators.

[0007] While preventing foreign matter invasion in the clearance between separators as the above cure by preparing the frame-like member made of resin in the rim section of a separator, how to make the laminating of a separator possible in parallel can be considered. The technique similar to this is indicated by JP,10-74530,A, JP,7-249417,A, and JP,61-279069,A.

[0008] However, if a sealant and the electrode layer structure contract in the direction of a separator laminating by degradation with the passage of time or a fuel cell expands and contracts under the effect of heat etc., the following problems will arise. For example, if the sealant protrusion height from a separator becomes lower order from frame-like member protrusion height, since contraction of separator spacing will be regulated by the frame-like member, a clearance may be generated between a separator, a sealant, or the electrode layer structure, and low Shimo of the generation-of-electrical-energy engine performance, as a result the situation of generation-of-electrical-energy impossible are caused.

[0009] on the other hand, if separator spacing spreads in response to the effect of heat etc., since an elastic return will be carried out and it will elongate in the direction of a separator laminating about the sealant which consists of rubber etc., if it is until to some extent, the breadth of separator spacing can be followed, without estranging from a separator, but about the frame-like member which consists of resin etc., since it does not elongate in the direction of a separator laminating, the breadth of separator spacing cannot be followed. For this reason, a clearance is generated between frame-like members and a possibility that a foreign matter may invade from there is produced.

[0010] Furthermore, in reactant gas passage, it is necessary to prevent the liquid junction to which a current flows through a cooling medium, and to prevent that an adjoining separator connects too hastily electrically in cooling-medium passage. Especially in the case of the fuel cell using a metal thin separator, since separator spacing is short, it is desirable to take specially the cure for preventing the electric short circuit between contiguity separators in consideration of a possibility that foreign matters, such as dust and a carbon particle, may mix into reactant gas.

[0011] This invention is made in view of the above-mentioned situation, and the place made into the purpose is in the fuel cell and fuel cell stack of a solid-state polyelectrolyte membrane type to insulate [ making absorbable telescopic motion of the direction of a separator laminating, making easy positioning at the time of a separator laminating, and ] the perimeter of the free passage hole formed in the separator.

[0012]

[Means for Solving the Problem] The following configurations were used for this invention in order to solve the above-mentioned technical problem. Invention indicated to claim 1 on both sides of the solid-state polyelectrolyte film (for example, solid-state polyelectrolyte film 7 in the gestalt of operation) The electrode of a pair In the fuel cell (for example, fuel cell 1 in the gestalt of operation) which formed (for example, the electrode 9 in the gestalt of operation), and pinched the outside with the separator (for example, separator 3 in the gestalt of operation) of a pair The insulating frame-like member which permits telescopic motion of separator spacing, carrying out the seal of the clearance between separators to the rim section of said separator It is characterized by forming (for example, the frame-like members 61, 81, 91, 101, 111, 121, and 131,141,251,261 in the gestalt of operation).

[0013] According to this configuration, it is lost to the motion by which producing a clearance between a separator and a frame-like member is lost to the motion which separator spacing can extend, and separator spacing is narrowed that that motion is prevented by the frame-like member.

[0014] Invention indicated to claim 2 is characterized by constituting said frame-like members (for example, frame-like member 101,111,121,131 in the gestalt of operation) possible [ relative sliding ] in a fuel cell according to claim 1.

[0015] According to this configuration, frame-like members carry out relative sliding and extensive \*\*

of separator spacing is absorbed mechanically.

[0016] Invention indicated to claim 3 is set to a fuel cell according to claim 1 or 2. Said separator It considers as metal. Said frame-like member (for example, frame-like members 61, 81, and 91,261 in the gestalt of operation) It is characterized by consisting of hard material (for example, body sections 61a, 81a, 91a, and 261a in the gestalt of operation), and an elasticity ingredient (for example, flexible absorption sections 61b, 81b, 91b, and 261b in the gestalt of operation).

[0017] According to this configuration, since elastic contraction in the direction of a separator laminating is possible for an elasticity member, relative approach of a separator is not regulated. Moreover, to the breadth of separator spacing, an elasticity member carries out an elastic return, develops in the direction of a separator laminating, and a separator is followed.

[0018] Invention indicated to claim 4 is characterized by equipping said frame-like member with a separator positioning means (for example, putting together as the combination of the crevice 123 and heights 125 in the gestalt of operation, the combination of end-face 131A and end-face 131B, the cross-section triangular-groove section 143, and the cross-section triangular protruding line section 145) in a fuel cell according to claim 1.

[0019] According to this configuration, a gap of the relative location between the separators which may be produced at the time of a separator laminating can be prevented.

[0020] Invention indicated to claim 5 is characterized by covering the periphery end face of said separator by said frame-like member (for example, frame-like members 61, 81, 91, 101, 111, 121, and 131,141,251,261 in the gestalt of operation) in a fuel cell according to claim 1 to 4.

[0021] According to this configuration, the electric short circuit in the periphery end face between adjoining separators can be prevented.

[0022] In a fuel cell according to claim 1 to 5, invention indicated to claim 6 surrounds the reaction side of said separator, and prepares a reaction side periphery seal member (for example, periphery sealant 52 in the gestalt of operation), and the lateral part of this reaction side periphery seal member is characterized by crossing to the whole surface and being covered by the insulating rim member (for example, flexible absorption section 261b in the gestalt of operation).

[0023] According to this configuration, since all the metal exposure parts of the separator in the lateral part of a reaction side periphery seal member are covered by the insulating rim member, corrosion resistance is raised and the electric short circuit between adjoining separators can be prevented.

[0024] Invention indicated to claim 7 is characterized by covering both sides of the lateral part of said reaction side periphery seal member (for example, periphery sealant 52 in the gestalt of operation) by the insulating rim member (for example, flexible absorption section 261b in the gestalt of operation) which crosses to the whole surface and is constituted by a reaction side periphery seal member and one in a fuel cell according to claim 6.

[0025] According to this configuration, as for both sides, the metal exposure part of the separator in the lateral part of a reaction side periphery seal member can prevent more a short circuit electric [ between the separators which raise corrosion resistance more and adjoin since all are covered by the insulating rim member ].

[0026] Invention indicated to claim 8 is a configuration with said one flat reaction side periphery seal member (for example, periphery sealant flat part 52b in the gestalt of operation) in said adjoining separator in a fuel cell according to claim 6 or 7, and it is characterized by said reaction side periphery seal member (for example, periphery sealant heights 52a in the gestalt of operation) of the separator of another side which opposes this being a convex configuration.

[0027] According to this configuration, since a configuration with flat one side and another side are set as the convex configuration, the combination of a reaction side periphery seal member can absorb a gap of the relative location of the reaction side periphery seal member of the convex configuration corresponding to the reaction side periphery seal member of a flat configuration.

[0028] In the fuel cell stack constituted by invention indicated to claim 9 carrying out two or more laminatings of the fuel cell according to claim 1 to 8, it is characterized by permitting telescopic motion of separator spacing, said frame-like member carrying out the seal of the clearance between each

separator.

[0029] According to this configuration, it is lost to the motion by which producing a clearance between a separator and a frame-like member is lost to the motion which separator spacing can extend between the fuel cells which adjoin in a single fuel cell, and separator spacing is narrowed that that motion is prevented by the frame-like member.

[0030] In the solid-state polyelectrolyte membrane type fuel cell which invention indicated to claim 10 prepared the electrode of a pair in the both sides of the solid-state polyelectrolyte film, and pinched the outside with the separator made from a metallic thin plate of a pair Around the free passage hole (for example, entrance-side oxidant gas free passage hole 41a in the gestalt of operation, outlet side oxidant gas free passage hole 41b, entrance-side fuel gas free passage hole 42a, outlet side fuel gas free passage hole 42b, entrance-side cooling-medium free passage hole 43a, outlet side cooling-medium free passage hole 43b) formed in said separator It is characterized by preparing an insulating member (for example, insulating members 201, 211, and 221,231,241,271 in the gestalt of operation).

[0031] According to this configuration, the liquid junction in cooling-medium passage and the electric short circuit between the adjoining separators in reactant gas passage can be prevented.

[0032] Each insulating member (for example, insulating member 201 in the gestalt of operation) of said separator with which invention indicated to claim 11 adjoins in a fuel cell according to claim 10 is characterized by having the clearance (for example, clearance 203 in the gestalt of operation) in the direction of a laminating of a separator.

[0033] According to this configuration, when the clearance between the directions of a laminating of a separator extensive-\*\*, telescopic motion of separator spacing is absorbable.

[0034] According to invention according to claim 12, in a fuel cell according to claim 10 or 11, each insulating member (for example, insulating member 211,221 in the gestalt of operation) of said adjoining separator is characterized by being constituted possible [ relative sliding ] so that telescopic motion of separator spacing may be permitted, carrying out the seal of the clearance between separators.

[0035] According to this configuration, insulating members carry out relative sliding and telescopic motion of separator spacing is absorbed mechanically.

[0036] Invention according to claim 13 is characterized by said insulating member (for example, insulating member 231,241 in the gestalt of operation) consisting of elasticity ingredients in a fuel cell according to claim 10 to 12.

[0037] According to this configuration, since elastic contraction in the direction of a separator laminating is possible for an elasticity ingredient, relative approach of a separator is not regulated, and to the breadth of separator spacing, an elasticity ingredient carries out an elastic return, develops in the direction of a separator laminating, and telescopic motion of separator spacing is followed at a separator.

[0038] Invention according to claim 14 is characterized by covering the inner circumference end face of said free passage hole by said insulating member (for example, insulating members 201, 211, and 221,231,241,271 in the gestalt of operation) in a fuel cell according to claim 10 to 13.

[0039] According to this configuration, the electric short circuit in the inner circumference end face of the free passage hole between adjoining separators can be prevented.

[0040] Said one insulating member (for example, insulating member flat part 271b in the gestalt of operation) of said separator with which invention according to claim 15 adjoins in a fuel cell according to claim 10 to 14 is a flat configuration, and it is characterized by said insulating member (for example, insulating member heights 271a in the gestalt of operation) of the separator of another side which opposes this being a convex configuration.

[0041] According to this configuration, since a configuration with flat one side and another side are formed in the convex configuration, the combination of an insulating member can absorb a gap of the relative location of the insulating member of the convex configuration corresponding to the insulating member of a flat configuration.

[0042] Invention according to claim 16 is set to a fuel cell according to claim 15. Surround the reaction side of said separator and a reaction side periphery seal member (for example, periphery sealant 52 in

the gestalt of operation) is prepared. Said one reaction side periphery seal member (for example, periphery sealant flat part 52b in the gestalt of operation) of said adjoining separator is a flat configuration. It is characterized by said reaction side periphery seal member (for example, periphery sealant heights 52a in the gestalt of operation) of the separator of another side which opposes this being a convex configuration.

[0043] According to this configuration, since a configuration with flat one side and another side are formed in the convex configuration, the combination of a reaction side periphery seal member can absorb a gap of the relative location of the reaction side periphery seal member of the convex configuration corresponding to the reaction side periphery seal member of a flat configuration.

[0044] Invention according to claim 17 is characterized by for the lateral part of said reaction side periphery seal member (for example, periphery sealant 52 in the gestalt of operation) crossing to the whole surface, and covering it by said insulating member (for example, insulating member 271 in the gestalt of operation) in a fuel cell according to claim 16.

[0045] According to this configuration, since all the metal exposure parts of the separator in the lateral part of a reaction side periphery seal member are covered by the insulating member, corrosion resistance is raised and the electric short circuit between adjoining separators can be prevented.

[0046] Invention according to claim 18 is characterized by said reaction side periphery seal member (for example, periphery sealant 52 in the gestalt of operation) and said insulating member (for example, insulating member 271 in the gestalt of operation) consisting of one in a fuel cell according to claim 16 or 17.

[0047] According to this configuration, a reaction side periphery seal member and an insulating rim member can be cast to coincidence.

[0048] Invention according to claim 19 is characterized by covering both sides of the lateral part of said reaction side periphery seal member (for example, periphery sealant 52 in the gestalt of operation) by the insulating rim member (for example, insulating member 271 in the gestalt of operation) which crosses to the whole surface and is constituted by a reaction side periphery seal member and one in a fuel cell according to claim 16 to 18.

[0049] According to this configuration, as for both sides, the metal exposure part of the separator in the lateral part of a reaction side periphery seal member can prevent more a short circuit electric [ between the separators which raise corrosion resistance more and adjoin since all are covered by the insulating member ].

[0050]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained, referring to an accompanying drawing. Drawing 1 is the top view of the separator 3 which constitutes the fuel cell 1 of the solid-state polyelectrolyte membrane type by the 1st operation gestalt. As this fuel cell 1 is shown in drawing 2, the electrode layer structure 5 which pinches and becomes with the electrode 9 of a pair carries out the laminating of a separator 3 and the solid-state polyelectrolyte film 7 by turns, it is constituted, and it is that two or more set laminating of these fuel cells 1 is carried out, and a fuel cell stack is constituted.

[0051] As shown in drawing 1, by carrying out press forming of the stainless steel plate manufacturing material of 0.2-0.5mm of board thickness, a separator 3 is equipped with the corrugated plate section 33 which it comes to form, and the flat-surface section 35 which contacts mutually through a sealant in the edge located outside each corrugated plate section 33, and consists of pitches with the fixed crevice 31 which has fixed height. [ much ]

[0052] Entrance-side oxidant gas free passage hole 41a for passing oxidant gas to the horizontal both-ends upper part side which is in that flat surface and is located in a periphery edge at this separator 3, Entrance-side cooling-medium free passage hole 43a for entrance-side fuel gas free passage hole 42a for passing fuel gas being prepared, and making a horizontal both-ends central site pass a cooling medium and outlet side cooling-medium free passage hole 43b for passing said cooling medium after use are prepared.

[0053] Moreover, outlet side oxidant gas free passage hole 41b for passing oxidant gas and outlet side

fuel gas free passage hole 42b for passing fuel gas are prepared in the horizontal both-ends lower part side which is in the flat surface and is located in a periphery edge at the separator 3 so that it may be set to entrance-side oxidant gas free passage hole 41a and entrance-side fuel gas free passage hole 42a with a diagonal location, respectively.

[0054] And in the separator 3 by the side of the cathode shown in drawing 1, after oxidant gas flows from entrance-side oxidant gas free passage hole 41a, it flows into each crevice 31 of the corrugated plate section 33, and flows out of outlet side oxidant gas free passage hole 41b toward the other shorter side side (drawing 1 left-hand side) from the demerits side side (drawing 1 right-hand side) of a separator 3. Moreover, after fuel gas flows from entrance-side fuel gas free passage hole 42a similarly in the separator by the side of an anode (illustration of a top view is omitted), it flows into each crevice of the corrugated plate section, and flows out of outlet side fuel gas free passage hole 42b toward the other shorter side side from the demerits side side of a separator.

[0055] In addition, entrance-side oxidant gas free passage hole 41a explained above, entrance-side fuel gas free passage hole 42a, entrance-side cooling-medium free passage hole 43a, outlet side oxidant gas free passage hole 41b, outlet side fuel gas free passage hole 42b, and outlet side cooling-medium free passage hole 43b correspond to the free passage hole concerning this invention.

[0056] While the 1st sealant 51 which encloses the outside of the corrugated plate section 33, entrance-side oxidant gas free passage hole 41a, outlet side oxidant gas free passage hole 41b, entrance-side fuel gas free passage hole 42a, and outlet side fuel gas free passage hole 42b is arranged, the 2nd sealant 53 surrounding the outside of entrance-side cooling-medium free passage hole 43a and outlet side cooling-medium free passage hole 43b is arranged in the front face and rear face of a separator 3. Here, said corrugated plate section 33 is a part corresponding to the reaction side of a separator, and the periphery sealant 52 surrounding the part which is equivalent to the periphery of the corrugated plate section 33 among said 1st sealant 51 corresponds to the reaction side periphery seal member concerning this invention. In addition, the part which adjoins entrance-side oxidant gas free passage hole 41a of the periphery sealant 52 and outlet side oxidant gas free passage hole 41b has cut the seal section in order to make oxidant gas flow or flow out. Moreover, in the separator by the side of an anode (illustration of a top view is omitted), the seal section of the part which adjoins entrance-side fuel gas free passage hole 42a of the periphery sealant 52 and outlet side fuel gas free passage hole 42b is cut similarly.

[0057] Furthermore, the frame-like member 61 of wrap insulation is arranged in the rim section of a separator 3 in the peripheral face and the periphery end face over the perimeter. This frame-like member 61 consists of flexible absorption section 61b of the parabolic edge section which consists of an ingredient which has elasticity by elasticity rather than body section 61a of the rectangular section which consists of rigid resin ingredients, such as a polyamide and PTFE, and this body section 61a, for example, rubber etc., as shown in drawing 2.

[0058] Interface 61A of these bodies section 61a and flexible absorption section 61b and upper limit side 61bA of flexible absorption section 61b are set as the low location rather than the upper limit sides 51A and 53A of the 1st and 2nd sealants, and the difference of elevation of these upper limit side 61bA and the upper limit sides 51A and 53A is set below to the compression cost of the 1st and 2nd sealants 51 and 53.

[0059] In addition, compression cost means the crushing cost at the time of making predetermined seal planar pressure act on a separator 3 by crushing the 1st and 2nd sealants 51 and 53 at the time of a separator laminating.

[0060] And the crevice 31 in the separator 3 which constitutes the fuel cell 1 of 1, If the crevice 31 in the separator 3 which constitutes other fuel cells 1 is compared one by one The space of the illustration parabolic edge section formed between the crevice 31 of a separator 3 and an electrode 9 It becomes the fuel gas passage 73 for circulating the oxidant gas passage 71 for circulating oxidant gas, and fuel gas, and the space of the illustration hexagon cross section which is surrounded by the separator 3 and formed in it becomes the cooling-medium passage 75 for circulating a cooling medium.

[0061] It is crushed in said compression cost that the 1st and 2nd sealants 51 and 53 should make predetermined seal planar pressure act on a separator 3, and should carry out the seal of the perimeter of



each free passage holes 41a, 42a, 43a, 41b, 42b, and 43b certainly at the time of this separator laminating. At this time, flexible absorption section 61b of the frame-like member 61 arranged in the rim section of each separator 3 is also pressed by the separator 3, and, specifically, only a predetermined dimension and the part which deducted the difference of elevation of upper limit side 61bA and the upper limit sides 51A and 53A are compressed from the compression cost of the 1st and 2nd sealants 51 and 53.

[0062] For this reason, even if separator spacing spreads in response to the effect of heat etc., in the direction of a separator laminating, flexible absorption section 61b of the frame-like member 61 carries out an elastic return, develops, and follows body section 61a of other frame-like members 61 which it is going to estrange from the flexible absorption section 61b concerned. Therefore, even if separator spacing can extend, since the frame-like member 61 which was carrying out mutual contact is not estranged, it can prevent the foreign matter invasion from the outside effectively, and its endurance of the 1st and 2nd sealants 51 and 53 also improves.

[0063] Moreover, since elastic contraction in the direction of a separator laminating is possible for flexible absorption section 61b, if it is range in which elastic contraction is possible, it will not regulate relative approach of a separator 3. Therefore, since flexible absorption section 61b contracts in the direction of a separator laminating and may decrease separator spacing even if the 1st and 2nd sealants 51 and 53 or electrode layer structures 5 carries out degradation with the passage of time and height becomes low, the close condition of these sealants 51 and 53 and the electrode layer structure 3, and a separator 3 can be maintained, and it lapses neither into generation-of-electrical-energy performance degradation nor generation-of-electrical-energy impossible.

[0064] in addition, since the frame-like member 61 is constituted from an insulating material, even if a fuel cell stack front face gets wet by water-ed, dew condensation, etc., it comes out that the effectiveness of a short circuit stopping occurring and the effectiveness of stopping also generating the short circuit by contact of adjoining separators are acquired from the first. Furthermore, since the periphery end face of a separator 3 is covered with the insulating material, the same is said of the ability to prevent the electric short circuit in the periphery end face of the adjoining separator 3.

[0065] Moreover, since the frame-like member 61 arranged in the rim section perimeter of a separator 3 and body section 61a which consists of a rigid resin ingredient especially function as a rib for reinforcement, deformation of the separator 3 of thin metal can also be prevented effectively. In addition, when it replaces with the separator 3 of this thin metal and a reinforcement function uses an unnecessary thick mold separator, the frame-like member 61 may consist of elasticity ingredients altogether.

[0066] The sectional view in which drawing 3 (a) shows the modification of the 1st operation gestalt, and drawing 3 (b) are the B-B sectional views of drawing 3 (a). Hereafter, in explanation of this modification, while giving the same sign as drawing 2 to the same component as drawing 2, the explanation is omitted.

[0067] As for the frame-like member 81 by this modification, flexible absorption section 81b extracts body section 81a at least to one side of the flexible absorption section 81b1 prolonged in parallel with a separator 3 with a wrap, and it comes to form a hole 83. These bodies section 81a and flexible absorption section 81b consist of same ingredients as body section 61a of drawing 2, and flexible absorption section 61b.

[0068] Although it extracts and a hole 83 discharges the surplus gas or generation dew condensation water between separators 3, as shown in drawing 3 (b), crookedness formation is carried out at the letter of the abbreviation for Z characters by shifting the location of Openings 83a and 83b crosswise [ separator ] ( drawing 3 (b) the vertical direction) that the foreign matter invasion from the outside should be prevented.

[0069] According to this modification as well as the 1st operation gestalt, since the frame-like member 81 is equipped with flexible absorption section 81b, aggravation prevention of the seal nature accompanying degradation of the foreign matter invasion prevention at the time of separator spacing increase, a sealant, etc. with the passage of time can be aimed at. In addition, although the frame-like



member 81 was arranged in the separator 3 located in the bottom of drawing 3 (a), it may be made to connect with the 2nd sealant 53 like.

[0070] The sectional view in which drawing 18 (a) shows other modifications of the 1st operation gestalt, and drawing 18 (b) are the enlarged drawings of periphery sealant heights 52a. Hereafter, in explanation of this modification, while giving the same sign as drawing 2 to the same component as drawing 2, the explanation is omitted.

[0071] In both sides of the lateral part of the periphery sealant 52 of a separator 3, i.e., the front flesh side of a lateral part, flexible absorption section 261b (insulating rim member) crosses body section 261a to the whole surface with a wrap, and the frame-like member 261 by this modification is covered with flexible absorption section 261b. Here, the periphery end face of a separator 3 is covered with the frame-like member 261, and the inner circumference end face of each free passage holes 41a, 42a, 43a, 41b, 42b, and 43b is covered with flexible absorption section 261b.

[0072] These bodies section 261a and flexible absorption section 261b consist of same ingredients as body section 61a of drawing 2, and flexible absorption section 61b. Moreover, flexible absorption section 261b is constituted by the 1st sealant 51 and one containing the periphery sealant 52, and the 2nd sealant 53 is constituted by one. And one periphery sealant flat part 52b of the adjoining separator 3 is formed in a flat configuration, and periphery sealant heights 52a of another side is formed in the convex configuration. Furthermore, the summit section of periphery sealant heights 52a is formed in the cross-section R configuration.

[0073] According to this modification as well as the 1st operation gestalt, since elastic contraction in the direction of a separator laminating is possible, flexible absorption section 261b can aim at aggravation prevention of the seal nature accompanying degradation of the foreign matter invasion prevention at the time of separator spacing increase, a sealant, etc. with the passage of time. Moreover, since the periphery end face of a separator 3 and the inner circumference end face of each free passage holes 41a, 42a, 43a, 41b, 42b, and 43b are covered with the frame-like member 261 and flexible absorption section 261b, The electric short circuit in the periphery end face of the adjoining separator 3 and the inner circumference end face of each free passage holes 41a, 42a, 43a, 41b, 42b, and 43b can be prevented.

[0074] Moreover, since all the metal exposure parts of the separator 3 in the lateral part of the periphery sealant 52 are covered by flexible absorption section 261b, corrosion resistance can be raised and the electric short circuit between the adjoining separators 3 can be prevented. Moreover, since flexible absorption section 261b, the 1st sealant 51, and the 2nd sealant 53 are constituted by one, these can be cast to coincidence and a production cost can be reduced.

[0075] Moreover, a gap of the location where periphery sealant heights 52a corresponding to [ since a configuration with flat one side and another side are set as the convex configuration ] periphery sealant flat part 52b has a relative combination of the periphery sealant 52 can be absorbed, the tuning of a seal location etc. becomes unnecessary, and productivity improves. Moreover, since the center section of the cross-section R configuration of the summit section of periphery sealant heights 52a of another side is strongly pressed by one periphery sealant flat part 52b at the time of a separator laminating, seal nature can be raised.

[0076] Drawing 4 is the sectional view showing the modification of further others of the 1st operation gestalt. Hereafter, in explanation of this modification, while giving the same sign as drawing 2 to the component of the drawing 2 identitas, the explanation is omitted.

[0077] In the reaction side 3A side of a separator 3, while the cover cost L1 of wrap body section 91a is set as the abbreviation one half of the wrap cover cost L2 in the cooling surface 3B side, as for the frame-like member 91 by this modification, it comes to unite flexible absorption section 91b only with the cooling surface side common-law marriage section of body section 91a. These bodies section 91a and flexible absorption section 91b consist of same ingredients as body section 61a of drawing 2, and flexible absorption section 61b.

[0078] According to this modification as well as the 1st operation gestalt, since the frame-like member 91 is equipped with flexible absorption section 91b, aggravation prevention of the seal nature accompanying degradation of the foreign matter invasion prevention at the time of separator spacing

increase, a sealant, etc. with the passage of time can be aimed at. Furthermore, since the protrusion height from a separator 3 is higher than flexible absorption section 61b of the 1st operation gestalt, flexible absorption section 91b of the frame-like member 91 by this modification can take more flexible cost now, and is excellent in especially the flattery nature at the time of separator spacing increase.

[0079] Next, the fuel cell concerning the 2nd operation gestalt of this invention is explained. Drawing 5 is the important section sectional view of this fuel cell. Hereafter, in explanation of this operation gestalt, while giving the same sign as drawing 2 to the same component as drawing 2, the explanation is omitted.

[0080] The frame-like member 101 by the gestalt of this operation is the point which absorbs telescopic motion of the direction of a separator laminating mechanically, and the above-mentioned 1st operation gestalt which absorbs telescopic motion using elastic deformation, and its modification differ from a basic configuration.

[0081] As for this frame-like member 101, protruding line section 101a is making the cross-section convex type configuration which it comes to project from base 101b, and that protruding line section 101a is arranged so that the inside (right-hand side of drawing 5) and the outside (left-hand side of drawing 5) of a fuel cell stack may be turned to by turns along the direction of a separator laminating. Moreover, by field 101B parallel to a separator 3, two adjoining frame-like members 101 do not contact, but usually touch by field 101A parallel to the direction of a separator laminating.

[0082] That is, while separator spacing is prescribed by the protrusion height from the separator 3 of the 1st and 2nd sealants 51 and 53 (only the 2nd sealant 53 is illustrated in drawing 5), this protrusion height is set up more greatly than the sum of the protruding line section 101a protrusion height from a separator 3, and base 101b protrusion height. Consequently, while adjoins and the clearance 103 is formed between base 101b of the frame-like member 101, and protruding line section 101a of the frame-like member 101 of another side.

[0083] According to this configuration, the motion which separator spacing expands and contracts is absorbed only by the clearance 103 between the these frame-like members 101 extensive-\*\*(ing), carrying out relative sliding without while adjoining and field 101A of the frame-like member 101 and field 101A of the frame-like member 101 of another side estranging. Therefore, aggravation prevention of the seal nature accompanying degradation of the foreign matter invasion prevention at the time of separator spacing increase, a sealant, etc. with the passage of time can be aimed at like the 1st operation gestalt.

[0084] Furthermore, with the gestalt of this operation, if its attention is paid to two adjoining frame-like members 101, since field 101B parallel to a separator 3 will not contact mutually, between these two frame-like members 101, the load which meets in the direction of a separator laminating does not occur. Therefore, the compressive load which acts on the 1st and 2nd sealants 51 and 53 stops distributing to the frame-like member 101, and reduction of seal planar pressure can be prevented effectively.

[0085] Drawing 6 is the sectional view showing the modification of the 2nd operation gestalt. Hereafter, in explanation of this modification, while giving the same sign as drawing 2 to the same component as drawing 2, the explanation is omitted.

[0086] While adjoins by the frame-like member 111 by this modification as well as the configuration of drawing 5. The frame-like member 111 Field 111A, Since the clearance 113 between the frame-like members 111 extensive-\*\*, carrying out relative sliding without field 111A of the frame-like member 111 of another side estranging Aggravation prevention of the seal nature accompanying degradation of the foreign matter invasion prevention at the time of separator spacing increase, a sealant, etc. with the passage of time and reduction prevention of seal planar pressure can be aimed at like the 2nd operation gestalt.

[0087] Furthermore, in this modification, the 2nd operation gestalt and configuration which changed the allomorph, i.e., the protrusion direction of protruding line section 101a, by turns in the direction of a separator laminating, and arranged the frame-like member 101 of the same cross-section configuration in the rim section of each separator 3 at the point which is arranging the frame-like member 111 of the same cross-section configuration in the rim section of each separator 3 with the same gestalt differ from

each other. Therefore, when really fabricating the frame-like member 111 with injection molding in the rim section of a separator 3, shaping only with one kind of metal mold is attained, and a production cost can be reduced.

[0088] Drawing 7 is the sectional view showing other modifications of the 2nd operation gestalt. Hereafter, in explanation of this modification, while giving the same sign as drawing 2 to the same component as drawing 2, the explanation is omitted.

[0089] While a crevice 123 is formed in the end face by the side of cooling surface 3B of a separator 3, the heights 125 which have the configuration which can fit into this crevice 123 are projected and formed in the frame-like member 121 by this modification at the end face by the side of reaction side 3A of a separator 3.

[0090] When the clearance 127 between the frame-like members 121 extensive-\*\*, while telescopic motion is absorbable according to this configuration, carrying out relative sliding without crevice inside 123A parallel to the direction of a separator laminating and heights external surface 125B estranging Since the frame-like member 121 of the same cross-section configuration is arranged in the rim section of each separator 3 with the same gestalt Aggravation prevention of the seal nature accompanying degradation of the foreign matter invasion prevention at the time of separator spacing increase, a sealant, etc. with the passage of time, reduction prevention of seal planar pressure, and reduction of a production cost can be aimed at like the modification of drawing 6.

[0091] Furthermore, if the heights 125 of the frame-like member 121 arranged in the crevice 123 of the frame-like member 121 which according to the frame-like member 121 by this modification while adjoins and was arranged by the separator 3 by the separator 3 of another side are inserted in, since alignment of the relative position between separators 3 will be carried out automatically, the workability at the time with a group and of maintenance improves. That is, in this modification, the separator positioning means which starts this invention by these crevices 123 and heights 125 is constituted.

[0092] Next, the fuel cell concerning the 3rd operation gestalt of this invention is explained. Drawing 8 is the important section sectional view of this fuel cell. Hereafter, in explanation of this operation gestalt, while giving the same sign as drawing 2 to the same component as drawing 2, the explanation is omitted.

[0093] Let the frame-like member 131 by the gestalt of this operation be the earthenware mortar-like inclined plane where end-face 131B by the side of end-face 131A by the side of cooling surface 3B of a separator 3 and reaction side 3A of a separator 3 comes to incline for each to fall an inside side to these cooling surface 3B and reaction side 3A (for the lower right to be \*\* in the important section cross section of drawing 8). A separator positioning means is constituted by these end-faces 131A and end-face 131B in the gestalt of this operation.

[0094] While telescopic motion of separator spacing is absorbed by carrying out relative sliding according to this configuration, without while adjoining and end-face 131A of the frame-like member 131 and end-face 131B of the frame-like member 131 of another side estranging Since alignment also of the relative position between separators 3 was carried out automatically and the frame-like member 131 of the same cross-section configuration was arranged in the rim section of each separator 3 with the same gestalt Improvement in workability at the time of - maintenance can be aimed at like the modification of drawing 6 at the time of aggravation prevention of the seal nature accompanying degradation of the foreign matter invasion prevention at the time of separator spacing increase, a sealant, etc. with the passage of time and reduction prevention of seal planar pressure, reduction of a production cost, and with a group.

[0095] Next, the fuel cell concerning the 4th operation gestalt of this invention is explained. Drawing 9 is the important section sectional view of this fuel cell. Hereafter, in explanation of this operation gestalt, while giving the same sign as drawing 2 to the same component as drawing 2, the explanation is omitted.

[0096] It comes to form the frame-like member 141 by the gestalt of this operation from the same elasticity ingredient as flexible absorption member 61b of drawing 2 in the shape of cross-section feathers of an arrow. A separator positioning means is constituted in this frame-like member 141 by the

cross-section triangular-groove section 143 formed in the end face by the side of cooling surface 3B, and the cross-section triangular protruding line section 145 formed in the end face by the side of reaction side 3A.

[0097] According to this configuration, when the frame-like member 141 carries out elastic telescopic motion, telescopic motion of separator spacing is absorbed. Moreover, if the cross-section triangular protruding line section 145 of the frame-like member 141 arranged in the cross-section triangular-groove section 143 of the frame-like member 141 which while adjoins and was arranged by the separator 3 by the separator 3 of another side is inserted in Since alignment of the relative position between separators 3 was carried out automatically and the frame-like member of the same cross-section configuration was further arranged in the rim section of each separator 3 with the same gestalt Improvement in workability at the time of - maintenance can be aimed at like the configuration of drawing 8 at the time of aggravation prevention of the seal nature accompanying degradation of the foreign matter invasion prevention at the time of separator spacing increase, a sealant, etc. with the passage of time and reduction prevention of seal planar pressure, reduction of a production cost, and with a group.

[0098] In addition, as the frame-like members 61, 81, 91, 101, and 111,121,131,141 explained above are shown in drawing 10 in the configuration with which the separator rim section was equipped, the rim of a separator 3 may be bent and Flections 3a, 3b, and 3c may be formed. Since according to this configuration the rib for reinforcement and the frame-like members 61, 81, 91, 101, and 111,121,131,141 fall out and Flections 3a, 3b, and 3c function as a stop, deformation of the separator 3 of thin metal and the desorption of the frame-like members 61, 81, 91, 101, and 111,121,131,141 can be prevented effectively.

[0099] Next, the fuel cell concerning the 5th operation gestalt of this invention is explained. Drawing 11 is the important section sectional view of this fuel cell. Hereafter, in explanation of this operation gestalt, while giving the same sign as drawing 2 to the same component as drawing 2, the explanation is omitted.

[0100] In this fuel cell, the annular insulating member 201 which consists inner skin and an inner circumference end face of wrap resin, rubber, etc. is arranged in the perimeter of entrance-side oxidant gas free passage hole 41a formed in the separator 3, entrance-side fuel gas free passage hole 42a, entrance-side cooling-medium free passage hole 43a, outlet side oxidant gas free passage hole 41b, outlet side fuel gas free passage hole 42b, and outlet side cooling-medium free passage hole 43b. In addition, in drawing 11, only outlet side fuel gas free passage hole 42b was illustrated.

[0101] According to this configuration, the liquid junction in cooling-medium passage and the electric short circuit between the contiguity separators in reactant gas passage can be prevented effectively. Especially the fuel cell by the gestalt of this operation has short separator spacing on the relation which uses the metal thin separator 3, and when preventing the electric short circuit between the above-mentioned separators, since it has disadvantageous structure, the effectiveness is exceptional. And in the free passage hole perimeter of this thin metal separator 3, since the insulating member 201 functions also as a rib for reinforcement, that deformation can also be prevented effectively.

[0102] Moreover, since it is set up so that a clearance 203 may be formed between the insulating members 201 so that the insulating member 201 in which while adjoins and the insulating member protrusion height from a separator table rear face was arranged by the separator 3, and the insulating member 201 of another side may not contact mutually namely, when this clearance 203 extensive-\*\*, it also has structure which can absorb telescopic motion of separator spacing.

[0103] For this reason, aggravation prevention of the seal nature accompanying degradation of the foreign matter invasion prevention at the time of separator spacing increase, a sealant, etc. with the passage of time and reduction prevention of seal planar pressure can be aimed at. Furthermore, since the insulating member 201 of the same cross-section configuration was arranged in the perimeter of a free passage hole of each separator 3 with the same gestalt, in case the insulating member 201 is really fabricated with injection molding to a separator 3, shaping only with one kind of metal mold is attained, and a production cost can also be reduced.

[0104] Drawing 12 and drawing 13 are the sectional views showing the modification of the 5th operation gestalt. Hereafter, in explanation of this modification, while giving the same sign as drawing 2 to the same component as drawing 2, the explanation is omitted.

[0105] In the modification of drawing 12, around each free passage holes 41a, 42a, 43a, 41b, 42b, and 43b The annular insulating member 211 which makes the same quality of the material as the frame-like member 101 and the same cross-section configuration of drawing 5 is arranged. For example, in the modification of drawing 13 The annular insulating member 221 which makes the same quality of the material as the frame-like member 111 and the same cross-section configuration of drawing 6 is arranged in the perimeter of each free passage holes 41a, 42a, 43a, 41b, 42b, and 43b.

[0106] According to these configurations, aggravation prevention of the seal nature accompanying degradation of the electric short circuit prevention between the liquid junction in cooling-medium passage and the contiguity separator in reactant gas passage, the foreign matter invasion prevention at the time of separator spacing increase, a sealant, etc. with the passage of time and reduction prevention of seal planar pressure as well as the configuration of drawing 11 can be aimed at. Especially, in the modification of drawing 13, since the insulating member 221 which the perimeter of each free passage holes 41a, 42a, 43a, 41b, 42b, and 43b is allotted is altogether made into the same cross-section configuration, in case the insulating member 221 is really fabricated with injection molding to a separator, shaping only with one kind of metal mold is attained, and a production cost can also be reduced.

[0107] Drawing 14 and drawing 15 are the sectional views showing the modification of further others of the 5th operation gestalt. Hereafter, in explanation of this modification, while giving the same sign as drawing 2 to the same component as drawing 2, the explanation is omitted.

[0108] In the modification of drawing 14, around each free passage holes 41a, 42a, 43a, 41b, 42b, and 43b The annular insulating member 231 which makes the same quality of the material as the frame-like member 61 and the same cross-section configuration of drawing 2 is arranged. For example, in the modification of drawing 15 The annular insulating member 241 which consists of the same quality of the material as flexible absorption section 61b of drawing 2 and which equipped one opening edge with flange section 241a is arranged in the perimeter of each free passage holes 41a, 42a, 43a, 41b, 42b, and 43b.

[0109] The production cost at the time of really fabricating the insulating member 231,241 with aggravation prevention of the seal nature accompanying degradation of the electric short circuit prevention between the liquid junction in cooling-medium passage and the contiguity separator in reactant gas passage, the foreign matter invasion prevention at the time of separator spacing increase, a sealant, etc. with the passage of time, reduction prevention of seal planar pressure, and injection molding to a separator as well as the configuration of drawing 11 is reducible with these configurations.

[0110] Next, the fuel cell concerning the 6th operation gestalt of this invention is explained. Drawing 19 (a) is the important section sectional view of this fuel cell, and drawing 19 (b) is the enlarged drawing of periphery sealant heights 52a. Hereafter, in explanation of this modification, while giving the same sign as drawing 2 to the same component as drawing 2, the explanation is omitted. In this fuel cell, both sides of the lateral part of the periphery sealant 52 of a separator 3, i.e., the front flesh side of a lateral part, cross to the whole surface, and it is covered with the insulating member 271. Moreover, the periphery end face of a separator 3 and the inner circumference end face of each free passage holes 41a, 42a, 43a, 41b, 42b, and 43b are also covered with the insulating member 271. This insulating member 271 consists of an ingredient which has elasticity by elasticity, such as rubber, like flexible absorption section 61b of drawing 2.

[0111] Furthermore, the insulating member 271 is constituted by the 1st sealant 51 and one containing the periphery sealant 52, and the 2nd sealant 53 is constituted by one. And one periphery sealant flat part 52b (insulating member flat part 271b) of the adjoining separator 3 is formed in a flat configuration, and periphery sealant heights 52a (insulating member heights 271a) of another side is formed in the convex configuration. Furthermore, the summit section of periphery sealant heights 52a is formed in the cross-section R configuration. 3d of level difference sections is formed in the periphery section of a separator

3, and the inner circumference section of each free passage holes 41a, 42a, 43a, 41b, 42b, and 43b, and the periphery section of a separator 3 and the inner circumference section of each free passage holes 41a, 42a, 43a, 41b, 42b, and 43b are changing with 3d of the level difference sections to the reaction side 3A side of a separator 3. And the clearance 273 is formed among reaction side 3A of the adjoining separator 3.

[0112] According to this configuration, the electric short circuit in the inner circumference end face of the periphery end-face \*\*\*\* free passage holes 41a, 42a, 43a, 41b, 42b, and 43b of the adjoining separator 3 can be prevented effectively. Moreover, as for both sides, the metal exposure part of the separator 3 in the lateral part of the periphery sealant 52 can prevent a short circuit electric [ between the separators 3 which raise corrosion resistance and adjoin since all are covered by the insulating member 271 ]. Moreover, since the insulating member 271, the 1st sealant 51, and the 2nd sealant 53 are constituted by one, these can be cast to coincidence and a production cost can be reduced.

[0113] Moreover, a gap of the location where periphery sealant heights 52a corresponding to [ since a configuration with flat one side and another side are formed in the convex configuration ] periphery sealant flat part 52b has a relative combination of the periphery sealant 52 can be absorbed, the tuning of a seal location etc. becomes unnecessary, and productivity improves. Moreover, since the center section of the cross-section R configuration of the summit section of periphery sealant heights 52a of another side is strongly pressed by one periphery sealant flat part 52b at the time of a separator laminating, seal nature can be raised.

[0114] Moreover, in the rim section and the free passage hole perimeter of this thin metal separator 3, since 3d of level difference sections functions also as a rib for reinforcement, that deformation can also be prevented effectively. Moreover, since it is set up so that a clearance 273 may be formed so that the level difference section protrusion height from a separator 3 table rear face may not contact mutually among reaction side 3A of the adjoining separator 3 that is, when this clearance 273 extensive-\*\*, it also has structure which can absorb telescopic motion of separator 3 spacing. For this reason, aggravation prevention of the seal nature accompanying degradation of the foreign matter invasion prevention at the time of separator spacing increase, a sealant, etc. with the passage of time and reduction prevention of seal planar pressure can be aimed at.

[0115] Drawing 16 is the sectional view showing the 6th operation gestalt. Hereafter, in explanation of this operation gestalt, while giving the same sign as drawing 2 to the same component as drawing 2, the explanation is omitted.

[0116] The frame-like member 251 by the gestalt of this operation covers the periphery of body section 251a arranged in the rim section of a separator 3 by flexible absorption section 251b which consists of isolators, such as rubber, and makes the function as the mounting section to the body of a car use also [ b / this / flexible absorption section 251 ].

[0117] Also by this configuration, aggravation prevention of the seal nature accompanying degradation of the foreign matter invasion prevention at the time of separator spacing increase, a sealant, etc. with the passage of time as well as the configuration of drawing 2 can be aimed at. Furthermore, since it serves also as a vibrationproofing function when the laminating of the fuel cell 1 is carried out to a longitudinal direction (horizontal), and it lays in the clamp face 300, and flexible absorption section 251b of the frame-like member 251 touches the clamp face 300 of a fuel cell 1, it becomes unnecessary to attach vibrationproofing components in a fuel cell stack with another object, and low cost-ization can also be attained.

[0118] You may make it prepare flexible absorption section 251b which consists of an isolator for two or more fuel cells of every here. The modification shown in drawing 17 shows the fuel cell stack which prepared flexible absorption section 251b which consists of an isolator for every fuel cell, and is arranging by turns flexible absorption section 251c which consists of the same quality of the material as flexible absorption section 251b which consists of an isolator, and flexible absorption section 61b of drawing 2 every other separator 3 in this fuel cell stack.

[0119] In addition, in the above operation gestalt and modification, although the separator 3 is constituted from stainless steel, you may constitute from metallic materials and carbonaceous



ingredients, such as titanium.

[0120]

[Effect of the Invention] According to this invention, the following effectiveness is acquired so that clearly from the above explanation.

(1) As opposed to the motion which separator spacing can extend according to invention according to claim 1 As opposed to the motion which is not made to produce a clearance between a separator and a frame-like member and by which separator spacing is narrowed Since the motion will not be prevented depending on a frame-like member, the poor seal accompanying degradation of the foreign matter invasion at the time of separator spacing increase, a sealant, etc. with the passage of time can be prevented effectively, and the good generation-of-electrical-energy engine performance can be maintained.

[0121] (2) According to invention according to claim 2, since it may come to absorb extensive \*\* of separator spacing mechanically by relative sliding of frame-like members, like the above, the poor seal accompanying degradation of the foreign matter invasion at the time of separator spacing increase, a sealant, etc. with the passage of time can be prevented effectively, and the good generation-of-electrical-energy engine performance can be maintained.

[0122] (3) Since elastic contraction in the direction of a separator laminating is possible for an elasticity member according to invention according to claim 3, do not regulate relative approach of a separator and receive the breadth of separator spacing. Since an elasticity member carries out an elastic return, develops in the direction of a separator laminating and a separator is followed, like the above, the poor seal accompanying degradation of the foreign matter invasion at the time of separator spacing increase, a sealant, etc. with the passage of time can be prevented effectively, and the good generation-of-electrical-energy engine performance can be maintained.

[0123] (4) According to invention according to claim 4, since alignment of a separator is automatically performed at the time of a separator laminating, the workability at the time with a group and of maintenance improves.

[0124] (5) According to invention according to claim 5, the electric short circuit in the periphery end face between adjoining separators can be prevented effectively, and the good generation-of-electrical-energy engine performance can be maintained.

[0125] (6) According to invention according to claim 6, the corrosion resistance of a separator is raised, and the electric short circuit between adjoining separators can be prevented effectively, and the good generation-of-electrical-energy engine performance can be maintained.

[0126] (7) According to invention according to claim 7, the corrosion resistance of a separator is raised more, and the electric short circuit between adjoining separators can be prevented more effectively, and the good generation-of-electrical-energy engine performance can be maintained. Moreover, since a reaction side periphery seal member and an insulating rim member can be cast to coincidence, reduction of a production cost can be aimed at.

[0127] (8) Since a gap of the relative location of the reaction side periphery seal member of the convex configuration corresponding to the reaction side periphery seal member of a flat configuration is absorbable according to invention according to claim 8, productivity improves.

[0128] (9) Since extensive \*\* of separator spacing can be followed now between the fuel cells which adjoin in a single fuel cell according to invention according to claim 9, like the above, the poor seal accompanying degradation of the foreign matter invasion at the time of separator spacing increase, a sealant, etc. with the passage of time can be prevented effectively, and the good generation-of-electrical-energy engine performance can be maintained.

[0129] (10) Since the liquid junction in refrigerant passage and the electric short circuit between the contiguity separators in reactant gas passage can be prevented effectively according to invention according to claim 10, the good generation-of-electrical-energy engine performance can be maintained much more certainly.

[0130] (11) According to invention according to claim 11, since telescopic motion of separator spacing is absorbable, aggravation prevention of the seal nature accompanying degradation of the foreign matter

invasion prevention at the time of separator spacing increase, a sealant, etc. with the passage of time and reduction prevention of seal planar pressure can be aimed at.

[0131] (12) According to invention according to claim 12, since telescopic motion of separator spacing is mechanically absorbable, aggravation prevention of the seal nature accompanying degradation of the foreign matter invasion prevention at the time of separator spacing increase, a sealant, etc. with the passage of time and reduction prevention of seal planar pressure can be aimed at.

[0132] According to invention according to claim 13, (13) Telescopic motion of separator spacing Since elastic contraction in the direction of a separator laminating is possible for an elasticity ingredient, do not regulate relative approach of a separator and the breadth of separator spacing is received. Since an elasticity ingredient carries out an elastic return, develops in the direction of a separator laminating and a separator is followed, aggravation prevention of the seal nature accompanying degradation of the foreign matter invasion prevention at the time of separator spacing increase, a sealant, etc. with the passage of time and reduction prevention of seal planar pressure can be aimed at.

[0133] (14) According to invention according to claim 14, the electric short circuit in the inner circumference end face of the free passage hole between adjoining separators can be prevented effectively, and the good generation-of-electrical-energy engine performance can be maintained.

[0134] (15) Since a gap of the relative location of the insulating member of the convex configuration corresponding to the insulating member of a flat configuration is absorbable according to invention according to claim 15, productivity improves.

[0135] (16) Since a gap of the relative location of the periphery sealant of the convex configuration corresponding to the periphery sealant of a flat configuration is absorbable according to invention according to claim 16, productivity improves.

[0136] (17) According to invention according to claim 17, the corrosion resistance of a separator is raised, and the electric short circuit between adjoining separators can be prevented effectively, and the good generation-of-electrical-energy engine performance can be maintained.

[0137] (18) According to invention according to claim 18, since a reaction side periphery seal member and an insulating member can be cast to coincidence, reduction of a production cost can be aimed at.

[0138] (19) According to invention according to claim 19, the corrosion resistance of a separator is raised more, and the electric short circuit between adjoining separators can be prevented more effectively, and the good generation-of-electrical-energy engine performance can be maintained.

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[Translation done.]



\* NOTICES \*

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

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## DESCRIPTION OF DRAWINGS

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### [Brief Description of the Drawings]

[Drawing 1] It is the top view showing the separator of the solid-state polyelectrolyte membrane type fuel cell by the 1st operation gestalt of this invention.

[Drawing 2] It is the sectional view which cut the fuel cell stack which carried out two or more laminatings of the solid-state polyelectrolyte membrane type fuel cell equipped with the separator of drawing 1, and constituted it in the location equivalent to the A-A line of drawing 1.

[Drawing 3] The important section sectional view in which (a) shows the modification of the 1st operation gestalt, and (b) are the B-B sectional views of (a).

[Drawing 4] It is the important section sectional view showing the modification of further others of the 1st operation gestalt.

[Drawing 5] It is the important section sectional view showing the 2nd operation gestalt of this invention.

[Drawing 6] It is the important section sectional view showing the modification of the 2nd operation gestalt.

[Drawing 7] It is the important section sectional view showing other modifications of the 2nd operation gestalt.

[Drawing 8] It is the important section sectional view showing the 3rd operation gestalt of this invention.

[Drawing 9] It is the important section sectional view showing the modification of the 3rd operation gestalt.

[Drawing 10] It is the important section sectional view showing other modifications of the 3rd operation gestalt.

[Drawing 11] It is the important section sectional view showing the 4th operation gestalt of this invention.

[Drawing 12] It is the important section sectional view showing the modification of the 4th operation gestalt.

[Drawing 13] It is the important section sectional view showing other modifications of the 4th operation gestalt.

[Drawing 14] It is the important section sectional view showing the 5th operation gestalt of this invention.

[Drawing 15] It is the important section sectional view showing the modification of the 5th operation gestalt.

[Drawing 16] It is the important section sectional view showing the 6th operation gestalt of this invention.

[Drawing 17] It is the important section sectional view showing the modification of the 6th operation gestalt.

[Drawing 18] The important section sectional view in which (a) shows other modifications of the 1st operation gestalt, and (b) are the enlarged drawings of periphery sealant heights.

[Drawing 19] The important section sectional view in which (a) shows the 5th operation gestalt, and (b) are the enlarged drawings of periphery sealant heights.

[Description of Notations]

1 Fuel Cell

3 Separator

7 Solid-state Polyelectrolyte Film

9 Electrode

41a Entrance-side oxidant gas free passage hole

41b Outlet side oxidant gas free passage hole

42a Entrance-side fuel gas free passage hole

42b Outlet side fuel gas free passage hole

43a Entrance-side cooling-medium free passage hole

43b Outlet side cooling-medium free passage hole

52 Periphery Sealant (Reaction Side Periphery Seal Member)

52a Periphery sealant heights (convex configuration)

52b Periphery sealant flat part (flat configuration)

61, 81, 91, 101, 111, 121, 131, 141, 251, 261 Frame-like member

61a, 81a, 91a, 261a Body section (part which consists of hard material)

61b, 81b, 91b, 261b (insulating rim member) Flexible absorption section (part which consists of elasticity ingredients)

123 Crevice (a Part of Positioning Means)

125 Heights (a Part of Positioning Means)

131A End face (a part of positioning means)

131B End face (a part of positioning means)

143 Cross-Section Triangular-Groove Section (a Part of Positioning Means)

145 Cross-Section Triangular Protruding Line Section (a Part of Positioning Means)

201, 211, 221, 231, 241, 271 Insulating member

203 Clearance

271a Insulating member heights (convex configuration)

271b Insulating member flat part (flat configuration)

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[Translation done.]